TITLE: STORM DOOR MORTISE LOCK THAT PREVENTS LOCKOUT

CROSS-REFERENCE TO RELATED APPLICATIONS

This application is a non-provisional of U.S. Serial Number 60/515,857 filed on October 30, 2003.

BACKGROUND OF THE INVENTION

Field of the Invention

The present invention generally relates to a storm door mortise lock and more specifically to a storm door mortise lock that prevents a lockout situation.

Prior Art

Storm door mortise locks typically have a dead bolt that is activated by a key cylinder body having a cam. The cam is rotated by either turning a thumb turn button or by use of the correct key in the key cylinder.

The key cylinder body of the prior art created a danger that a lockout situation could occur. If the cam was over rotated, it would fall out of the notch in the dead bolt assembly and if the dead bolt assembly stopped in a position wherein the cam cannot re-enter the dead bolt. This could leave the dead bolt engaged without a means to disengage it, commonly known as a lockout situation. This would greatly inconvenience the storm door operator and possibly require the disassembly of the storm door. There is therefore a need for a mortise lock that will prevent a lockout situation.

As seen in Figure 4, one solution of preventing a lockout situation is to provide stops to halt the forward and rearward movement of the cam. While this prevents a lockout situation, there is no biasing effect by the stops against the cam to provide a positive feedback to the user that the deadbolt is moving from an unlocked to locked position and vice versa. There is therefore a need for a spring that influences the cam to provide a positive feedback of movement.

In addition, the prior art utilized a spring on the inside of the deadbolt. This spring acted upon the cam to bias it toward the stop and out of the plane of the deadbolt. If there was a flaw in the stop such as a crack, an improperly bent stop, or improperly placed stop

the spring could push the cam out of the plane of the deadbolt and cause a lockout situation. There is therefore a need for a spring located outside the deadbolt which biases the cam into the plane of the deadbolt thus preventing a lockout situation.

Still further, the prior art does not use a cam that is interconnected with the dead bolt. This lack of interconnection provides the possibility of a lockout situation as there becomes wear on the stops. In addition, during mass manufacture of the mortise lock it is important to have a rapid evaluation process of interconnectivity that results in preventing a lockout situation. Therefore, there is a need for an interconnection with the cam which prevents a lockout situation and provides for rapid evaluation during the manufacturing process to assure that a lockout situation is prevented.

There is therefore a need for a storm door with a mortise lock that avoids these and other problems.

Features of the Present Invention

A general feature of the present invention is the provision of a storm door mortise lock which overcomes the problems found in the prior art.

A still further feature of the present invention is the provision of a storm door mortise lock that includes built in stops in the deadbolt to prevent a lockout situation.

A still further feature of the present invention is the provision of a storm door mortise lock that has a spring which provides positive feedback that the deadbolt is moving from an unlocked to a locked position.

A still further feature of the present invention is the provision of a storm door mortise lock with a cam body interacting with the spring which provides positive feedback that the deadbolt is moving from an unlocked to a locked position.

A still further feature of the present invention is the provision of a storm door mortise lock that includes a spring biasing the cam inside the plane of the deadbolt.

A still further feature of the present invention is the provision of a storm door mortise lock that interconnects the deadbolt with the cam to prevent a lockout situation.

These, as well as other features and advantages of the present invention will become apparent from the following specification and claims.

BRIEF SUMMARY OF THE INVENTION

The present invention generally comprises an apparatus for providing a storm door mortise lock with lockout prevention. The mortise lock may be either a reversible mortise lock or a solid core mortise lock. The mortise lock includes a lock body having opposed side plates with a dead bolt assembly and a live bolt assembly intermediate the side plates. The bolts slide between retracted and extended positions beyond the edge of the door. A cam is also intermediate the side plates and therefore integral with the mortise lock body. The mortise lock of the present invention also includes a thumb turn button and a key cylinder that are separate from the cam. The thumb turn button and key cylinder are secured to opposite escutcheon plates. A spindle operatively links the key cylinder, cam and thumb turn button. Because these parts are separate, they can be used in storm doors of varying thicknesses by only changing the length of the spindle.

Further, the mortise lock body of the present invention includes apparatus for prevention of a lockout situation. The apparatus may include built in stops into the deadbolt. These stops prevent the cam from over rotating and resulting in a lockout situation.

A still further feature of the present invention is the provision of a storm door mortise lock that has a spring which provides positive feedback that the deadbolt is moving from an unlocked to a locked position.

A still further feature of the present invention is the provision of a storm door mortise lock with the cam body interacting with the spring which provides positive feedback that the deadbolt is moving from an unlocked to a locked position.

A still further feature of the present invention is the provision of a storm door mortise lock that includes a spring biasing the cam inside the plane of the deadbolt.

A still further feature of the present invention is the provision of a storm door mortise lock that interconnects the deadbolt with the cam to prevent a lockout situation.

These features of novelty and various other advantages that characterize the invention are pointed out with particularity in the claims annexed hereto and forming a part hereof. However, for a better understanding of the invention, its advantages, and the objects obtained by its use, reference should be made to the drawings which form a further part hereof, and to the accompanying descriptive matter, in which there is illustrated and described a preferred embodiment of the invention.

BRIEF DESCRIPTION OF THE DRAWINGS

Referring now to the drawings, wherein like reference numerals indicate corresponding structure throughout the several views.

Figure 1 is a partial perspective view of an edge of a storm door with the mortise lock of the present invention installed therein.

Figure 2 is an exterior top perspective view of a mortise lock according to the principles of the present invention.

Figure 3 is an interior top perspective view of the mortise lock shown in Figure 2.

Figure 4 is an interior partial exploded perspective view of the mortise lock body of the prior art.

Figure 4A is an exterior side view of the mortise lock body of the prior art with the deadbolt assembly in a locked position.

Figure 5 is an interior partial exploded perspective view of the mortise lock body of the present invention.

Figures 6 is an interior side view of the mortise lock body of the present invention with the deadbolt assembly in a locked position.

Figures 7 is an interior side view of the mortise lock body of the present invention with the deadbolt assembly in an intermediate position.

Figures 8 is an interior side view of the mortise lock body of the present invention with the deadbolt assembly in an unlocked position.

DETAILED DESCRIPTION OF THE INVENTION

The present invention will be described as it applies to its preferred embodiment. It is not intended that the present invention be limited to the described embodiment. It is intended that the invention cover all modifications and alternatives which may be included within the spirit and scope of the invention.

Referring now to the drawings, wherein like reference numerals and letters indicate corresponding structure throughout the several views, and referring in particular to Figures 1, 2 and 3, there is shown a storm door 10 and mortise lock 20 according to the present invention. The mortise lock 20 preferably includes a lock body 22, exterior escutcheon

assembly 24 and interior escutcheon assembly 26. The exterior escutcheon assembly 24 has a handle 28 to actuate the live bolt assembly 30. The key cylinder 32, used to turn the dead bolt assembly 36, is also part of the exterior escutcheon assembly 24. The interior escutcheon assembly 26 also includes a handle 29 to actuate the live bolt assembly 30. A thumb turn button 34 is also provided to turn the dead bolt assembly 36. The live bolt assembly 30 and the dead bolt assembly 36 are secured to the lock body 22.

The key cylinder 32 of the present invention is separate from and does not include the cam 58. By separating the key cylinder 32 from the cam 58, the cross-sectional profile of the key cylinder 32 can be minimized and the thickness of the mortise lock body 22 can be minimized and can be altered to allow the lock to be placed in a door body of varying thickness. The cross-sectional profile of the key cylinder 32 is generally circular. A spindle (not shown) is rotatably secured to the key cylinder 32. The key pin or pins are incorporated within the key cylinder housing. The key cylinder 32 is secured to the exterior escutcheon plate 24. The thumb turn button 34 is preferably rotatably secured to the interior escutcheon plate 26 by a retaining ring. The thumb turn button 34 includes at least one mounting slot for receiving the spindle.

The prior art lock body 22 and deadbolt assembly 36 is shown in Figure 4 and Figure 4A. The lock body 22 includes a cam 58 rotatably secured between two side plates 54 and 55. The cam 70 includes a through hole 56. When installed, the spindle passes through the hole 56 and into the thumb turn button 34 such that turning of either the key cylinder 32, by a corresponding key (not shown), or the thumb turn button 34 will turn the cam 70 and actuate the dead bolt assembly 36. In the prior art, rotation of the cam 70 is limited by one or more stops 72 formed in or secured to the side plates 54 and 55. These stops 72 generally prevent the cam 58 from ever losing operative interaction with the notch in the deadbolt assembly 36. In this way, the prior art prevents lockout situations.

As is shown in Figures 6 - 8, during actuation of the dead bolt assembly 36, the cam 58 of the present invention will rotate through approximately a 90 degree arc. Rotation of the cam 58 may be limited by one or more stops 38 formed in or secured to the dead bolt assembly 36. The cam generally includes a cam body 60 and a cam arm 62. The cam arm 62 extends axially from the cam body 60 and into the dead bolt assembly 36. When the cam arm 62 is rotated in one direction the dead bolt assembly 36 is extended and the storm

door 10 is secured. When the cam arm 62 is rotated in the opposite direction, the dead bolt assembly 36 is retracted and the storm door may be opened. The stops 38 generally prevent the cam arm 62 from ever losing operative interaction from within the dead bolt assembly 36. This prevents lockout situations.

Additionally, a spring 50 is mounted between the side plates 54, 55 by a spring mount 52. The spring 50 biases the cam arm 62 to either an unlocked position or a locked position. As seen in Figure 7, the cam 58 goes in a neutral position when it is approximately perpendicular to the deadbolt. This neutral position helps provide a positive feel to the user that the lock is slipping between a locked position as seen in Figure 6 to an unlocked position as seen in Figure 8. It is to be understood that numerous spring configurations can be used to influence the cam body 60. In this embodiment, the spring is a leaf spring attached to the side plate at only one spring end. However, an alternative embodiment may have a spring attached to the side plate at both spring ends.

Alternatively, the spring 50 may be used to limit the rotation of the cam. As seen in Figures 6, 7 and 8, the cam body 60 may have a first flat surface 66 and a second flat surface 68. These two pieces come to a point, as seen in Figure 6. When the deadbolt 36 is in a locked position a first flat surface 66 is approximately parallel with a surface of the leaf spring 50. As the cam body 60 is rotated to place the lock into an intermediate position, the point between the first flat surface 66 and a second flat surface 68 presses down upon the leaf spring causing the leaf spring to exert a biasing effect upon the cam body 60. When the cam 58 is rotated through the intermediate position the biasing force from the leaf spring 50 acts upon the cam body 60 until it is flush and parallel with the second flat surface 68 of the cam body 60 as seen in Figure 8. Thus, in this fashion the leaf spring 50 prevents the cam 58 from going past the deadbolt assembly 36 because the spring 50 is pressing against the first flat surface 66 or second flat surface 68 to keep it within the plane of the notch 40. This further prevents lockout situations.

In addition, the cam 58 may have a cam finger 64 attached to the cam arm 62. The cam finger 64 provides a further tool to prevent a lockout situation by enabling the deadbolt assembly 36 and the cam 58 to be interconnected. In this embodiment, the deadbolt assembly 36 has a first notch or first notch portion 40 which permits unobstructed rotation of the cam arm 62. As shown in Figures 6-7 the first notch 40 is trapezoidal in shape. In

addition, the deadbolt assembly 36 may have a second notch or second notch portion 42 within the first notch 40 which interacts with the cam finger 64. The cam finger 64 can be seen in Figure 7A. The second notch 42 preferably has a closed end 44 that prevents the cam finger 64 from slipping out. Thus, the interaction between the cam finger 64 and the closed end 44 creates interconnectivity that prevents a lockout situation.

The second notch may also have a lock indent 46 that is approximately perpendicular to the cam finger 64 when the deadbolt assembly 36 is in the locked position that prevents closing of the deadbolt assembly 36 by means other than rotation of the key cylinder 32 or thumb turn button 34. The second notch 42 may also have an unlock indent 48 that is approximately perpendicular to the cam finger 64 when the deadbolt assembly 36 is in the unlocked position that prevents unintentional opening of the deadbolt by means other than the key cylinder 32 or the thumb turn button 34.

Finally, it should be noted that there is a vertical side 47 extending from the lock indent 46 and a vertical side 49 extending from the unlock indent 48. The juncture of the vertical side 47 with the lock indent 46 creates an obstruction such that the cam arm 62 slips over and locks into place in the lock indent 46. This locking action provides a positive feel to the user that the cam 58 is indeed in the locked position. Similarly, the vertical side 49 juncture with the unlock indent 48 creates an obstruction which when the cam arm 62 passes over provides a positive feel to the user that the deadbolt assembly 36 is in the unlocked position. It is to be understood that this positive feel of moving into the lock and unlock positions may be achieved by other forms than as illustrated in Figures 6-8.

A preferred embodiment of the present invention has been set forth above. It should be understood by one of ordinary skill in the art that modifications may be made in detail, especially in matters of shape, size and arrangement of parts. Such modifications are deemed to be within the scope of the present invention which is to be limited only by the broad general meaning of the terms in which the appended claims are expressed.